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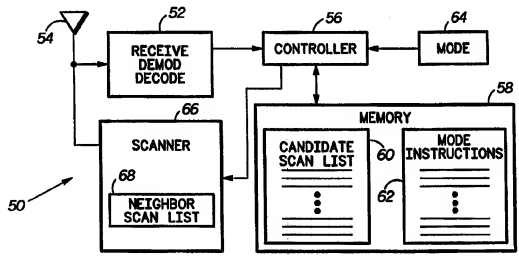

(57) Abstract

In a cellular communication system (50), a plurality of neighbor scan lists (68, 60) are generated and associated with a selected cell.

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NEIGHBOR SCANNING IN A CELLULAR RADIOTELEPHONE SYSTEM

Field of the Invention

This invention relates generally to cellular communication systems, and more specifically to a method and system for controlling neighbor scanning in a subscriber unit in a cellular communications system.

Background of the Invention

In a cellular communications system, subscriber units communicate voice and/or data with one or more base stations. As a subscriber unit moves through a coverage area, the subscriber unit communication channel is switched or handed off from one base station to another base station in order to improve the communication link.

In more sophisticated cellular communication systems, the subscriber unit takes on a greater share of the task of deciding which base station to communicate with. For example, when the subscriber unit is in an idle mode, which is a mode in which the subscriber unit has not been assigned a traffic channel, the subscriber unit may monitor paging messages or other overhead messages transmitted by nearby base stations in order to receive notification of an incoming call. As the subscriber unit moves through the service area, it decides which base station is the best base station to monitor for receiving these messages.

When the subscriber unit is in an active mode, wherein the subscriber unit has been assigned a traffic channel, the subscriber unit scans signals from neighboring base stations in order to report the characteristics of those signals so that a mobility manager may determine whether or not a better communication link can be established with an alternate base station.

The list of base station signals scanned by the subscriber unit is contained in a neighbor scan list. This neighbor scan list contains neighbor identifiers that instruct the subscriber unit how to receive and measure signals from neighboring base stations. For example, in a CDMA (Code Division Multiple Access) system, a neighbor identifier may include a frequency, a pilot offset, and other information describing the configuration of that base station. Such configuration information may describe the number and location of the paging channels for the base station.

The subscriber unit typically receives a neighbor scan list as one of the overhead messages that is transmitted on the paging channel to all subscribers currently monitoring that paging channel. After receiving a neighbor scan list from the paging channel, the subscriber unit typically enters the idle mode, wherein the subscriber unit is waiting to receive or initiate a call.

One problem with the neighbor scan lists that are broadcast on the paging channel is that these lists are often too long for idle mode scanning. They are too long because they contain neighbor identifiers that are needed only after the subscriber enters the active mode. The problem with scanning too many neighbors in the idle mode is that it reduces standby battery life by causing the subscriber unit to stay awake longer to scan signals associated with all the neighbor identifiers.

Additionally, the subscriber unit may be asked to scan signals from base stations that do not support a traffic channel. For example, some cells may have a base station that transmits a pilot channel, and does not support a traffic channel. These cells are often referred to as a "pilot beacon cells." These pilot beacon cells are used to determine that a subscriber unit is reaching the outer limits of the cellular coverage area. In some instances, the subscriber unit may attempt an idle-mode handoff to one of these "pilot beacon cells" with no traffic channel. This may result in additional delays in acquiring a new cell that supports traffic channels. These delays occur because the handoff is not direct to a cell

that supports a traffic channel—rather the handoff is indirect to a pilot beacon cell that expressly, or by default, directs the subscriber unit to a cell on another frequency. During this "indirect idle-mode handoff" the subscriber unit may not be able to receive an incoming call or originate an outgoing call.

After a call has been received or initiated, and after the subscriber unit has been assigned a traffic channel, the subscriber unit may receive messages that update the neighbor scan list while it is in the active mode. But there are problems with receiving neighbor scan list updates when the subscriber unit is in the active mode.

First, sending neighbor scan list update messages must be directed to a particular user, and second, the list must be transmitted in the CDMA traffic channel. When in the idle mode, neighbor scan lists are broadcast to all listening subscriber units, which requires less message processing and does not displace any data in the traffic channel. In known cellular systems, a lengthy message may be required to modify the neighbor scan list or transmit a totally new neighbor scan list. Such lengthy messages in the traffic channel may degrade voice or user data transmission.

With reference now to **FIG. 1**, there is depicted a portion of a service area **20** of a cellular communication system. Shown in service area **20** are fifteen cells numbered C0-C14. Cells C0-C4 each contain two carriers operating on frequencies F_1 and F_2. For example, as shown in cell C3, the two carrier frequencies are shown at reference numerals **22** and **24**. As indicated by solid lines, both frequency F_1, **22** and F_2, **24** support a traffic channel, which transmits user data.

Cells C5, C6 and C8 each contain a traffic channel on frequency F_1. However, on frequency F_2, cells C5, C6 and C8 have a pilot beacon, and perhaps a paging channel and a sync channel, but no traffic channel. The pilot beacon on frequency F_2 is shown at reference numeral **26** with a dashed line.

Cells C7, C9-C11 only broadcast on frequency F_1; these cells do not have any transmission on frequency F_2. Cells C12-C14 have only a pilot beacon on F_1, as indicated by dashed lines.

The cell configurations shown in service area **20** analogously resemble a wedding cake, which may occur at the boundary between a high traffic area and a lower traffic area, wherein the high traffic area is supported by two carrier frequencies. On the boundary between the high traffic area and the lower traffic area, pilot beacons are used to help the mobility manager decide when a call should be handed off from frequency F_2 to frequency F_1.

When subscriber unit **28** powers up in cell C0 on F_2, the F_2 paging channel transmits neighbor scan list **30** to all subscriber units monitoring the paging channel. Note that when the subscriber unit is in the idle mode, it can make measurements on more than one frequency because it can retune its receiver without having to worry about continuously receiving traffic. Thus, neighbor scan list **30** includes neighbor identifiers for cells C1-C7 on frequency 1, and also neighbor identifiers for cells C1-C6 for frequency 2.

The neighbor identifiers that comprise neighbor scan list **30** are typically selected by the cellular communications system designer because they are signals associated with base stations with which the subscriber unit is most likely to establish its next communication link. For example, as subscriber unit **28** moves out of cell C0 it is likely that one of the signals identified in neighbor scan list **30** will become a more desirable signal with which the subscriber unit can maintain communication with the cellular communication system. Neighbor scan list **30** merely predicts and informs the subscriber unit where its next communication link with the communication system may be established rather than relying upon the subscriber unit to find the next base station link by itself.

In some situations, neighbor scan list **30** includes neighbor identifiers, such as C5 F_2 and C6 F_2, which are pilot beacon cells.

Including pilot beacon cells in the neighbor scan list causes the problem associated with the indirect idle-mode handoff, as discussed above.

The reason pilot beacons are included in neighbor scan list **30** is because the subscriber unit may use them after entering the active mode to perform a hard handoff from, for example, frequency F_2 to frequency F_1 in cells C5, C6, or C8. A problem arises when subscriber unit **28** initiates an outgoing call just as subscriber unit **28** travels out of cell C0 while communicating on frequency F_2. To facilitate a subscriber handoff to frequency F_1, subscriber unit **28** reports handoff information obtained from receiving pilot beacons and paging channels on F_2 from cells C5, C6, and C8. If this handoff information is not immediately available upon entering the active mode as the subscriber leaves C0, the call may be dropped. Therefore, in the prior art, the neighbor can list used in the idle mode included extra neighbor identifiers that were needed only after the subscriber entered the active mode. This made the neighbor scan list used in the idle mode longer than it needed to be for idle mode operation.

Thus, it should be apparent that there are disadvantages to having to many or to few neighbor identifiers in the neighbor scan list as the subscriber unit changes between an idle mode and an active mode. Therefore, a need exists for an improved method and system for controlling neighbor scanning in a subscriber unit in a cellular communication system.

Brief Description of the Drawings

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objects, and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

FIG. 1 depicts a portion of a service area of a cellular communications system, and a neighbor scan list, according to the prior art;

FIG. 2 is a high-level logical flow chart which illustrates the method of associating neighbor scan list with subscriber modes in accordance with the method and system of the present invention;

FIG. 3 is a high-level logical flow chart which illustrates deriving and scanning neighbor scan lists in response to a subscriber mode in accordance with the method and system of the present invention;

FIG. 4 is a high-level block diagram of a portion of a subscriber unit which may be used to implement the method and system of the present invention;

FIG. 5 is a candidate scan list and associated mode instructions in accordance with the method and system of the present invention;

FIG. 6 is a neighbor scan list for a subscriber in the idle mode which has been derived in accordance with the method and system of the present invention; and

FIG. 7 is a neighbor scan list for a subscriber in the active mode which has been derived in accordance with the method and system of the present invention.

Detailed Description of the Invention

With reference to the figures, and in particular with reference to FIG. 2, there is depicted a high-level flow chart which illustrates the process of selecting neighbor identifiers for neighbor scan list in with the method and system of the present invention. As illustrated, the process begins at block 100, and thereafter passes to block 102 wherein the process selects a first cell in the cellular communication system. Next, the process selects a first subscriber mode from a plurality of subscriber operating modes, as illustrated at block 104. Such subscriber modes may include an idle mode, wherein a traffic channel has not been assigned and the subscriber unit is waiting to initiate or receive a call over a traffic channel,

and an active mode, wherein the subscriber unit has been assigned a traffic channel for transferring user data. Additional operating modes may be defined in the subscriber unit as needed to manage neighbor scanning in various modes of operation of the cellular communication system. These operating modes may include a roaming mode, a high speed data mode, a data-only mode, a selected protocol mode, or any other operating mode, or subscriber capability (*e.g.*, subscriber protocol revision), that may cause the cellular system designer to customize the selection of neighbor identifiers in the neighbor scan list.

Next, the process selects neighbor identifiers for a neighbor scan list for the selected subscriber mode and the selected cell, as depicted at block **106**. Neighbor identifiers include information necessary for a subscriber unit to receive a signal or other data from an identified cell.

According to an important aspect of the present invention, the system designer selects neighbor identifiers based upon what operating mode the subscriber is in and what cell the subscriber unit is communicating with. For example, if cell C0 is the selected cell (the cell the subscriber unit is communicating with), and the idle mode is the selected subscriber mode, the neighbor identifiers in the C0 idle mode neighbor scan list may include C1-C4 on frequency F_2 and C5-C8, and C10 on frequency F_1. This neighbor scan list is shown in **FIG. 6**. Note that the neighbor scan list for the idle mode may include more than one frequency because the subscriber unit can more easily retune to an alternate frequency in the idle mode while it is not processing a traffic channel data stream. Also note that pilot beacons, such as C5, C6, and C8 on F_2, are not included in the idle mode neighbor scan list because the subscriber unit may not be able to receive paging messages or initiate an outgoing call from these pilot beacon cells.

In an active mode neighbor scan list, the cellular system designer may wish to include or delete neighbor identifiers which may or may not have been in the idle mode scan list. As shown in **FIG. 7**, the process may

select neighbor identifiers for an active mode neighbor scan list that include signals on the same frequency, and may also include pilot beacon (PB) signals. Selecting neighbor identifiers for signals on the same frequency is desired because the subscriber unit may have difficulty scanning signals on a frequency other than the traffic channel frequency. Pilot beacons may be desired in the active mode scan list because they give direction to the cellular system regarding hard handoff to another frequency as the subscriber unit reaches the edge of coverage for the current frequency.

Those persons skilled in the art should recognize that neighbor identifiers may be included or excluded from neighbor scan lists based upon a number of factors and peculiarities of system operation. In fact, cells and their associated pilot beacons may be classified into different classes according to their purpose. For example, a first classification may be assigned to cells having more than one carrier frequency supporting a traffic channel. A second classification may identify a cell with one carrier frequency that supports a traffic channel and another carrier frequency that supports only a pilot beacon and a paging channel. A third classification of cells may be assigned to cells with only a pilot beacon. The purpose of the second class of cells may be to indicate that a subscriber will soon need to perform a hard handoff between carrier frequencies as the subscriber unit travels toward the second class of cell. The purpose of the third class of cell may indicate that the subscriber unit is traveling toward the edge of the coverage area for the current multiple access scheme, and the subscriber may be dropped, or may need to scan to explore the possibility of a hard handoff to another multiple access system. For example, the subscriber may be approaching the edge of CDMA coverage and the pilot beacon may inform the subscriber unit to scan for, say, a signal from an AMPS (advanced mobile phone service) system in order to handoff to continue the call.

As illustrated in **FIG. 1**, class one cells may include C5, C6, and C8. Class three cells may include cells C12-C14.

Next, the process determines whether or not there are additional subscriber modes for which a neighbor scan list should be selected, as illustrated at block **108**. If there are additional subscriber modes, the process selects the next subscriber mode, as depicted at block **110**. For the newly selected subscriber mode, the process continues by selecting neighbor identifiers for another neighbor scan list, as illustrated at block **106**.

If there are no additional subscriber modes, the process determines whether or not there are additional cells in the cellular communication system for which neighbor scan list should be selected, as depicted at block **112**. If there are additional cells, the process selects the next cell in the cellular service area, as illustrated at block **114**, and continues processing at block **104**.

After neighbor scan lists have been generated for all subscriber modes in all cells, the process generates a candidate scan list for each cell, wherein the candidate scan list is the union of the neighbor identifiers in the scan lists for each subscriber mode, as depicted at block **116**. Thus, the candidate scan list contains all neighbor identifiers that are in one or more neighbor scan lists associated with the subscriber modes in a particular cell.

Next, the process generates mode instructions, which enable the subscriber unit to select neighbor identifiers from the candidate scan list to derive a neighbor scan list for each subscriber mode, as illustrated at block **118**. With reference to **FIG. 5**, there is depicted an example of a candidate scan list and the associated mode instructions, which may be determined according to blocks **116** and **118** of **FIG. 2**. The mode instructions give the subscriber unit enough information to derive neighbor scan lists for whatever mode the subscriber unit is currently operating in. Sample instructions include: an all mode instruction, an idle mode only instruction, and an active mode only instruction. Thus, some instructions cause selected neighbor identifiers to be used in both active and idle modes, while other instructions cause the subscriber unit

to select neighbor identifiers in only the active mode or only the idle mode. **FIGs. 6** and **7** represent lists derived from information in **FIG. 5**.

Other mode instructions may take the form of instructions that modify the current neighbor scan list to derive a scan list for a new mode of operation. Such modification instructions may include an instruction that temporarily adds, or temporarily deletes, a selected neighbor identifier when the subscriber unit enters, say, the active mode.

After neighbor scan lists are selected for each operating mode in each cell, and the lists are consolidated to form candidate scan lists for each cell, and after subscriber mode instructions are generated, the process terminates, as illustrated at block **120**.

With reference now to **FIG. 3**, there is depicted a high-level flow chart depicting control of neighbor scanning in a subscriber unit in accordance with a preferred embodiment of the method and system of the present invention. As shown, the process begins at block **200**, and thereafter passes to block **202** wherein the subscriber unit is in the idle mode. Thereafter, the subscriber unit receives a candidate scan list from a cell base station, as illustrated at block **204**. The subscriber unit typically receives the candidate scan list via the paging channel, which is broadcast to all subscriber units in communication with the base station.

Next, the subscriber unit receives mode instructions for deriving neighbor scan lists from the candidate scan list in response to the subscriber unit operating mode, as depicted at block **206**. Examples of these mode instructions are shown in the right hand column of **FIG. 5**. These mode instructions inform the subscriber unit how to select neighbor identifiers from the candidate scan list to derive a neighbor scan list according to the operating mode of the subscriber unit. Examples of these mode instructions include: an all mode instruction, an idle mode only instruction, and an active mode only instruction. Each instruction is associated with a neighbor identifier in the candidate scan list.

After receiving the candidate list, and the mode instructions, the subscriber unit derives a neighbor scan list associated with the idle mode

by using the mode instructions and the candidate scan list, as illustrated at block **208**. As depicted at block **210**, the process then scans the idle mode neighbor scan list, and performs idle mode handoffs between base stations. As the subscriber hands off to a new base station, a new candidate scan list with new mode instructions may be received via a new paging channel.

Thereafter, the process determines whether or not the subscriber has changed to the active mode, as illustrated at block **212**. If the subscriber has not changed to the active mode, the subscriber continues to scan the idle mode neighbor scan list as illustrated at block **210**.

If the subscriber unit has changed to the active mode, the process derives a new neighbor scan list associated with the active mode by using the mode instructions, as depicted at block **214**. Thereafter, the process scans the active mode neighbor scan list, as illustrated at block **216**. As the subscriber unit is handed off to a new base station, a new candidate scan list with mode instructions may be transferred to the subscriber unit via the traffic channel.

As depicted at block **218**, the process determines whether or not the subscriber unit has entered the idle mode, either by the user terminating the call with the end command, or by the call being dropped. If the subscriber has not entered the idle mode, the subscriber unit continues to scan the active mode neighbor scan list, as illustrated at block **216**.

If the subscriber has entered the idle mode, the subscriber unit derives a neighbor scan list associated with the idle mode by using the mode instructions, as depicted at block **220**. Thereafter, the process iteratively returns to block **210**, wherein the subscriber unit scans the idle mode neighbor scan list.

According to the present invention, a subscriber unit may receive a separate neighbor scan list for each operating mode of the subscriber unit. However, in a preferred embodiment, which is illustrated in FIGs. 2 and 3, these scan list may be consolidated into a candidate scan list that has associated mode instructions for directing the subscriber unit to generate

an appropriate scan list upon entering a new operating mode. It should also be emphasized that upon changing operating mode, no additional neighbor scan list instructions are needed from the cellular infrastructure system to derive a neighbor scan list for the new operating mode. All data necessary for deriving neighbor scan lists for all modes of operation may be transmitted to the subscriber unit over the paging channel while the subscriber unit is in the idle mode. This means that the subscriber unit has the active mode neighbor scan list before entering the active mode, and upon entering the active mode, the subscriber unit can immediately switch to a new scan list. Therefore, if a subscriber unit has initiated a call just before leaving a particular cell, it may immediately and automatically be reconfigured to scan pilot beacons, so that it can make measurements and report to the mobility manager to quickly facilitate a hard handoff from one carrier to another, or a hard handoff from one multiple access system to another.

With reference now to **FIG. 4**, there is depicted a high-level block diagram of a portion of a subscriber unit which may be used to implement the method and system of the present invention. As illustrated, subscriber unit **50** includes receiver **52** coupled to antenna **54**. Receiver **52** receives, demodulates, and decodes signals from antenna **54**. In a preferred embodiment, receiver **52** receives, demodulates, and decodes CDMA signals from a base station in a CDMA cellular communication system.

Controller **56** is coupled to receiver **52** for receiving a plurality of neighbor scan lists, which are then stored in memory **58**. In one embodiment of the present invention, subscriber unit **50** may receive a neighbor scan list for each subscriber mode in the current cell. Examples of these scan list for various operating modes are illustrated in **FIGs. 6** and **7**. However, in a preferred embodiment of the present invention, a candidate scan list and an associated list of mode instructions are received in subscriber unit **50**, wherein the lists shown in FIGs. **6** and **7** may be derived from the candidate list using the mode instructions. This reduces

the number of neighbor identifiers transmitted to subscriber unit **50**, and reduces the size of memory **58** required to store the plurality of neighbor scan list. Thus, in a preferred embodiment, memory **58** may be divided into candidate scan list memory **60** and mode instruction memory **62**, for storing neighbor identifiers and mode instructions, as depicted in **FIG. 5**.

Controller **56** is also coupled to mode detector **64** for detecting an operating mode of subscriber unit **50**. Such operating modes may include an idle operating mode and an active operating mode.

Controller **56** is further coupled to scanner **66**, which measures signal characteristics of signals from other cells as such signals are received by antenna **54**. Neighbor scan list **68** is depicted within scanner **66** to illustrate the fact that a neighbor scan list comprising neighbor identifiers is derived or recalled from data stored in memory **58**. Thus, those persons skilled in the art will understand that neighbor scan list **68** may be stored in memory in scanner **66** or may be stored in memory **58**. According to an important aspect of the present invention, the neighbor identifiers in neighbor scan list **68** are selected by controller **56** in response to input from mode detector **64** and mode instructions. Therefore, neighbor scan list **68** may change according to the operating mode of subscriber unit **50**.

While scanner **66** is shown separately from receiver **52**, scanner **66** may share significant portions of the hardware used in receiver **52**.

The foregoing description of a preferred embodiment of the invention has been presented for the purpose of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Modifications or variations are possible in light of the above teachings. The embodiment was chosen and described to provide the best illustration of the principles of the invention and its practical application, and to enable one of ordinary skill in the art to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. All such modifications and variations are within the scope of the invention as

determined by the appended claims when interpreted in accordance with the breadth to which they are fairly, legally, and equitably entitled.

Claims

What is claimed is:

1. A method in a cellular communication system for controlling neighbor scanning in a subscriber unit, the method comprising the steps of:

generating a plurality of neighbor scan lists associated with a selected cell in the cellular communication system, wherein each neighbor scan list includes selected neighbor identifiers;

determining a present operating mode of a plurality of operating modes of a subscriber unit communicating with the selected cell; and

in response to the present operating mode of the subscriber unit, configuring the subscriber unit to scan a neighbor scan list selected from the plurality of neighbor scan lists for the selected cell.

2. The method for controlling neighbor scanning according to claim 1 wherein each of the plurality of neighbor scan lists is associated with one of the plurality of operating modes of the subscriber unit.

3. The method for controlling neighbor scanning according to claim 1 wherein the plurality of operating modes of the subscriber unit includes an idle mode and an active mode.

4. The method for controlling neighbor scanning according to claim 1 further includes the steps of:

detecting a change in operating modes in the subscriber unit; and

in response to the change, automatically reconfiguring the subscriber unit to scan an alternate neighbor scan list selected from the plurality of neighbor scan lists for the selected cell.

5. The method for controlling neighbor scanning according to claim 1 further including the steps of:

prior to detecting an operating mode change in the subscriber unit, communicating to the subscriber unit a plurality of neighbor scan lists including a present operating mode scan list associated with the present operating mode and a second operating mode scan list associated with a second operating mode; and

in response to detecting an operating mode change from the present operating mode to the second operating mode, automatically reconfiguring the subscriber unit to scan the second operating mode scan list.

6. The method for controlling neighbor scanning according to claim 5 wherein the step of communicating to the subscriber unit a plurality of neighbor scan lists further includes the steps of:

communicating to the subscriber unit a candidate scan list that is the union of at least the present operating mode scan list and the second operating mode scan list; and

communicating mode instructions to the subscriber unit for deriving, from the candidate scan list, a plurality of neighbor scan lists including at least the present operating mode scan list and the second operating mode scan list.

7. The method for controlling neighbor scanning according to claim 6 wherein the step of communicating mode instructions to the subscriber unit for deriving a plurality of neighbor scan lists from the candidate scan list further includes the step of communicating mode instructions to the subscriber unit for deleting neighbor identifiers from the present operating mode scan list to derive the second operating mode neighbor scan list.

8. The method for controlling neighbor scanning according to claim 6 wherein the step of communicating mode instructions to the subscriber unit for deriving a plurality of neighbor scan lists from the candidate scan list further includes the step of communicating mode instructions to the subscriber unit for adding neighbor identifiers from the candidate scan list to derive the second operating mode neighbor scan list.

9. The method for controlling neighbor scanning according to claim 6 wherein the step of communicating mode instructions to the subscriber unit for deriving a plurality of neighbor scan lists from the candidate scan list further includes the step of communicating a mode instruction associated with each neighbor identifier in the candidate scan list to the subscriber unit, wherein the mode instruction is one of a group comprising: scan an associated neighbor identifier in all operating modes, scan an associated neighbor identifier only in an active mode, and scan an associated neighbor identifier only in an idle mode.

10. A system in a cellular communication system for controlling neighbor scanning in a subscriber unit comprising:

means for generating a plurality of neighbor scan lists associated with a selected cell in the cellular communication system, wherein each neighbor scan list includes selected neighbor identifiers;

means for determining a present operating mode of a plurality of operating modes of a subscriber unit communicating with the selected cell; and

means for configuring the subscriber unit to scan a neighbor scan list selected from the plurality of neighbor scan lists for the selected cell, in response to the present operating mode of the subscriber unit.

11. The system for controlling neighbor scanning according to claim 10 wherein each of the plurality of neighbor scan lists is associated with one of the plurality of operating modes of the subscriber unit.

12. The system for controlling neighbor scanning according to claim 10 wherein the plurality of operating modes of the subscriber unit includes an idle mode and an active mode.

13. The system for controlling neighbor scanning according to claim 10 further comprising:

means for detecting a change in operating modes in the subscriber unit; and

means for automatically reconfiguring the subscriber unit to scan an alternate neighbor scan list selected from the plurality of neighbor scan lists for the selected cell in response to the change.

14. The system for controlling neighbor scanning according to claim 10 further comprising:

means for communicating to the subscriber unit, prior to detecting an operating mode change in the subscriber unit, a plurality of neighbor scan lists including a present operating mode scan list associated with the present operating mode and a second operating mode scan list associated with a second operating mode; and

means for automatically reconfiguring the subscriber unit to scan the second operating mode scan list in response to detecting an operating mode change from the present operating mode to the second operating mode.

15. The system for controlling neighbor scanning according to claim 14 wherein the means for communicating to the subscriber unit a plurality of neighbor scan lists further includes:

means for communicating to the subscriber unit a candidate scan list that is the union of at least the present operating mode scan list and the second operating mode scan list; and

means for communicating mode instructions to the subscriber unit for deriving, from the candidate scan list, a plurality of neighbor scan lists including at least the present operating mode scan list and the second operating mode scan list.

16. The system for controlling neighbor scanning according to claim 15 wherein the means for communicating mode instructions to the subscriber unit for deriving a plurality of neighbor scan lists from the candidate scan list further includes means for communicating mode instructions to the subscriber unit for deleting neighbor identifiers from the present operating mode scan list to derive the second operating mode neighbor scan list.

17. The system for controlling neighbor scanning according to claim 15 wherein the means for communicating mode instructions to the subscriber unit for deriving a plurality of neighbor scan lists from the candidate scan list further includes means for communicating mode instructions to the subscriber unit for adding neighbor identifiers from the candidate scan list to derive the second operating mode neighbor scan list.

18. The system for controlling neighbor scanning according to claim 15 wherein the means for communicating mode instructions to the subscriber unit for deriving a plurality of neighbor scan lists from the candidate scan list further includes means for communicating a mode instruction associated with each neighbor identifier in the candidate scan list to the subscriber unit, wherein the mode instruction is one of a group comprising: scan an associated neighbor identifier in all operating modes, scan an associated neighbor identifier only in an active mode, and scan an associated neighbor identifier only in an idle mode.

19. A system in a cellular communication system for controlling neighbor scanning in a subscriber unit comprising:

a receiver coupled to an antenna;

a controller coupled to the receiver for receiving a plurality of neighbor scan lists, wherein each of the plurality of neighbor scan lists is associated with a selected cell and a selected mode of operation of the subscriber unit;

memory means coupled to the controller for storing the plurality of neighbor scan lists;

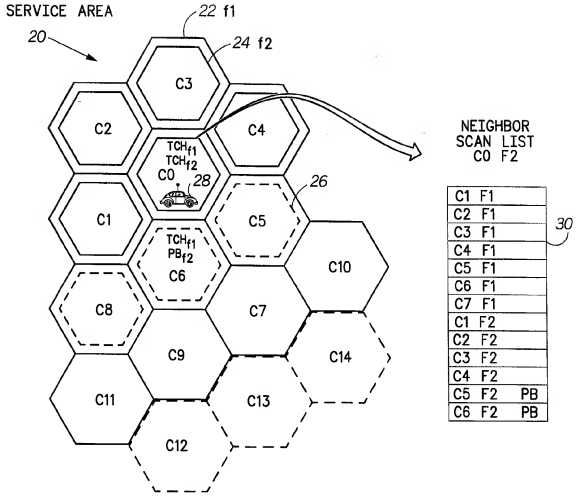
a mode detector coupled to the controller for detecting an operating mode of the subscriber unit; and

a scanner coupled to the antenna and the controller for scanning a neighbor scan list selected by the controller in response to the operating mode of the subscriber unit.

20. The system for controlling neighbor scanning according to claim **19** wherein each neighbor scan list includes a plurality of neighbor identifiers, and wherein the memory means further comprises:

candidate scan list memory for storing a candidate scan list, wherein the candidate scan list is the union of the neighbor identifiers in the plurality of neighbor scan lists; and

mode instruction memory for storing mode instructions, wherein the mode instructions identify neighbor identifiers in each of the plurality of neighbor scan lists.



PRIOR ART

FIG. 1

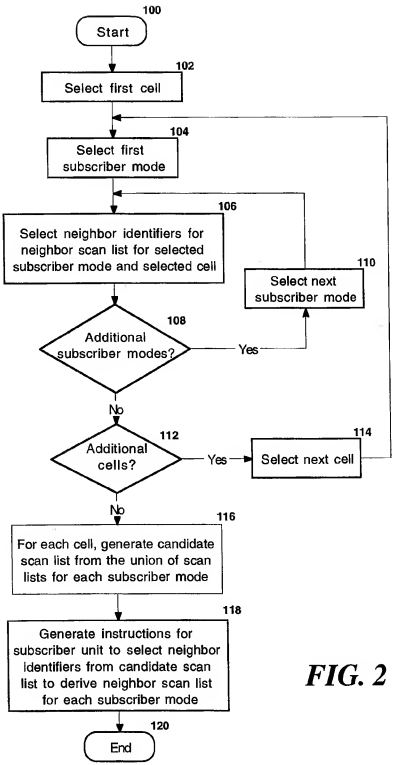

100
Start
102
Select first cell
104
Select first subscriber mode
106
Select neighbor identifiers for neighbor scan list for selected subscriber mode and selected cell
110
Select next subscriber mode
108
Additional subscriber modes?
Yes
No
112
Additional cells?
Yes
114
Select next cell
No
116
For each cell, generate candidate scan list from the union of scan lists for each subscriber mode
118
Generate instructions for subscriber unit to select neighbor identifiers from candidate scan list to derive neighbor scan list for each subscriber mode
120
End

FIG. 2

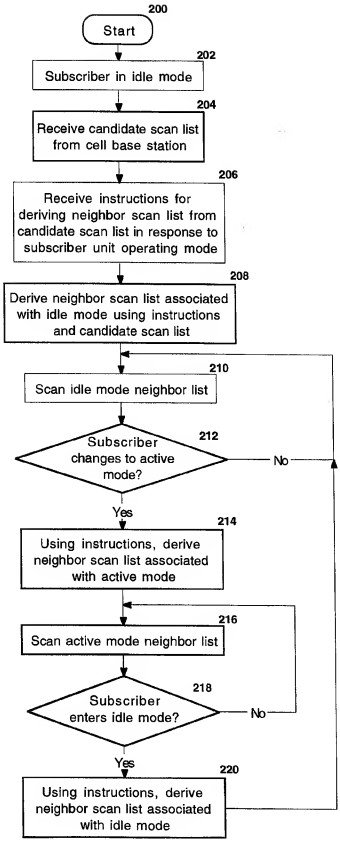

200
Start
202
Subscriber in idle mode
204
Receive candidate scan list from cell base station
206
Receive instructions for deriving neighbor scan list from candidate scan list in response to subscriber unit operating mode
208
Derive neighbor scan list associated with idle mode using instructions and candidate scan list
210
Scan idle mode neighbor list
212
Subscriber changes to active mode?
No
Yes
214
Using instructions, derive neighbor scan list associated with active mode
216
Scan active mode neighbor list
218
Subscriber enters idle mode?
No
Yes
220
Using instructions, derive neighbor scan list associated with idle mode

FIG. 3

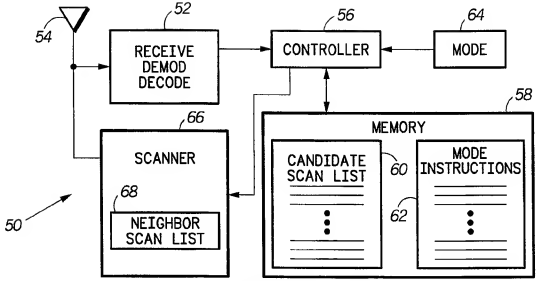


FIG. 4

CANDIDATE SCAN LIST CELL CO F2	MODE INSTRUCTIONS
C1 F2	ALL MODES
C2 F2	ALL MODES
C3 F2	ALL MODES
C4 F2	ALL MODES
C5 F1	IDLE MODE ONLY
C6 F1	IDLE MODE ONLY
C5 F2 PB	ACTIVE MODE ONLY
C6 F2 PB	ACTIVE MODE ONLY
C7 F1	IDLE MODE ONLY
C8 F1	IDLE MODE ONLY
C8 F2 PB	ACTIVE MODE ONLY
C10 F1	IDLE MODE ONLY

FIG. 5

NEIGHBOR SCAN LIST IDLE MODE
C1 F2
C2 F2
C3 F2
C4 F2
C5 F1
C6 F1
C7 F1
C8 F1
C10 F1

FIG. 6

NEIGHBOR SCAN LIST ACTIVE MODE
C1 F2
C2 F2
C3 F2
C4 F2
C5 F2 PB
C6 F2 PB
C8 F2 PB

FIG. 7